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OBSERVATIONS

ON

FRACTURES OF THE NECK

OF THE

THIGH-BONE,

BEING AN APPENDIX TO THE WORK ON

DISLOCATIONS AND FRACTURES OF THE JOINTS.

BY

SIR ASTLEY COOPER, BART., F.R.S.

SURGEON TO THE KING, &c. &c.

LONDON:

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MDCCCXXIII.

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ADVERTISEMENT.

THESE Observations were intended to be published as an Appendix to a Third Edition of my Work on Dislocations and Fractures of the Joints; but finding that the printing of that Work would take more time than I had anticipated, I have been induced to give this portion of the intended Appendix in a separate form, in order to redeem the promise which has been made to the Public.

September, 1823. *A. COOPER.*

ERRATA.

Page 19, line 16, after *limb*, insert *from a bone.*
—— 43, — 6, for *he*, read *the author.*

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OBSERVATIONS

ON

FRACTURES OF THE NECK

OF THE

THIGH-BONE.

I HAD made a resolution in early life never to notice any controversial production, but to suffer my statements to fall into oblivion if they were wrong, or to be confirmed, if correct, by experience and by time, which are the only tests of truth. But when I observe the rising generation likely to be misled by incorrect surgical principles; when I see my opinions (unintentionally no doubt) misrepresented; and, more especially, when I perceive the practice of the Hospital to which I belong censured, I should be wanting in the most common, as well as the best feelings of nature, if I did not repel such attacks.

Guy's Hospital is the most glorious monument of individual humanity existing in a country which exceeds all others as much in its philanthropy as in its power and glory. All who are in the sphere of that Institution, are fully aware that its Treasurer

toils unceasingly for its prosperity, and for the welfare of its school; that he has introduced the best regulations possible for its management, some of which have been copied by other hospitals; that its Physicians and its Surgeons have the power, not only of bestowing every comfort upon their patients, but that even luxuries are heaped upon them if they be necessary to their recovery; that there is no Officer in the establishment, whatever may be his situation, who would not be immediately discharged for any act of inhumanity; and, that large and magnificent as it is, so anxious are the poor of London to be received within its walls, that many of its numerous and disappointed applicants for admission, are obliged to seek refuge in some other such noble Asylum, with which the Metropolis abounds. Every Officer of the Hospital glories in the Institution,—is jealous of its honour,—and indignant at any insinuation against its excellence.

With respect to my work upon Dislocations and Fractures of the Joints, I am disposed to hope it may be found to be useful, from the numerous assurances I have received from different parts of the country, that it has had the effect of settling the minds of the profession upon the symptoms and treatment of those accidents upon which there had been previously very indecisive, and, in many cases, erroneous opinions. I have not the vanity to believe that it is faultless, but my medical brethren must be aware that it is the result of near forty years experience of a life not passed in professional idleness; and if ten years are still granted me to pursue that profession, to correct what is

wrong, and to supply that which is deficient, I hope to leave the work worthy of perusal to my successors, and that it will not be a discredit to my memory.

The Plates which illustrate the work will be at all times valuable, as they are from preparations which are preserved in the Museum of St. Thomas's Hospital, and are faithful representations of nature; and, as she is almost uniform in her operations, and exhibits the same appearances under similar accidents, these appearances will be found to be the same so long as the world endures.

In making some observations on the remarks on my work, in a recent publication,* it is not my intention, either in spirit or in word, to descend from the character of a gentleman; but I shall examine the essential points in which the opinions differ from mine; and omit the mention of names, because I contend for doctrines, and not with individuals.

But before I proceed to the analysis of this production, which the imputation cast upon Guy's Hospital first roused me to notice, let me state the opinion which is attempted to be controverted. First—I hold it to be a *general principle* that fractures of the neck of the thigh-bone,—fractures of the patella,—those of the condyles of the os humeri within the joint,—that of the olecranon,—and that of the coronoid process of the ulna,—unite by ligament and not by bone. Secondly—That in the case in which ossific union is supposed to have been produced in the neck of the thigh-bone,

* "Practical Observations on Surgery."

the appearances are similar to those morbid changes in the structure of the bone, by which the head of the os femoris sinks upon its shaft.

With respect to the first of these positions, it has been observed by the able and intelligent editor of the Medico-Chirurgical Journal, "that it has been *falsely* asserted that I deny the possibility of the union of a fractured neck of the thigh-bone:" and, to shew that I only contend for a *general principle*, and am ready to allow an exception might occur, I make the following quotations from my work on Dislocations and Fractures of the Joints, Second Edition:—Page 127. "In all the examinations which I have made of transverse fractures of the cervix femoris, entirely within the capsular ligament, I have never met with one in which an ossific union had taken place, or which did not admit of motion of one bone upon the other; *to deny its possibility, and to maintain that no exception to a general rule can take place*, would be presumptuous, especially, when we consider the varieties of direction in which a fracture may occur, and the degree of violence by which it may be produced; as, for example, when the fracture is through the head of the bone, and there is no separation of its fractured end; or when the bone is broken without its periosteum* or reflected ligament being torn; or when it is broken obliquely, partly within, and partly external to the capsular ligament; but all I wish to be understood to say is, that if it ever does

* I beg to be understood, that I do not say that such fractures will unite, but that some extraordinary variety in the fracture might produce a rare exception.

happen it is a very rare occurrence, and that I have not yet met with a single example of it."

Again, with respect to its treatment, I observe, page 142. "I am never so wedded to any opinion as to be prevented from trying, or wishing others to employ means which appear plausible or ingenious; and, therefore, this instrument ought to have a fair trial given to it."*

To prevent too hasty a decision on the nature of the case, and to lead men to act with caution, I have said, page 144, "In every case, however, in which there is the smallest doubt whether it is a fracture within, or one external to the ligament, it would be proper to treat the case as if it were the fracture I shall hereafter describe, and which admits of ossific union."

Again, page 143. "The cases in which *union might be produced are two:*—one in which the periosteum covering the neck of the thigh-bone is not torn through, which now and then happens; the other is when the head of the bone is broken, so that the cervix still remains in the acetabulum;† but in neither of these cases, will the limb exhibit the shortened state which the fracture of the neck of the bone usually produces." These quotations are considered sufficient to confirm Dr. Johnson's statement.

As a proof that the general principle which I have stated is correct, in the Appendix to the Second Edition of my work I have produced the following forty-three cases, from different

* An instrument for extending the thigh to produce union of the cervix femoris, invented by Mr. Hagerdorn.

† Mr. Brodie informed me of a case of that kind.

collections, of non-union by bone, of fractures of the neck of the thigh-bone.

In St. Thomas's Collection - - -	7 specimens
In the College of Surgeons - - -	1 ditto
In St. Bartholomew's - - - -	6 ditto
At Dublin - - - - - -	12 ditto
In Mr. Langstaffe's of Basinghall-street -	6 ditto
In Mr. Bell and Mr. Shaw's - - -	6 ditto
In Mr. Brooke's - - - - -	2 ditto
In Dr. Monro's - - - - -	2 ditto
Mr. Mayo's Collection - - - -	1 ditto
	43

To these I have now to add another, from an experiment upon a living animal; while, upon the opposite side of the question, only a single instance, upon which the mind can for a moment dwell, has yet been produced; and in this, the same appearances were found in both the thigh-bones, and even these resembled what I have several times observed in the dead body, arising from a softened state of the bones. I have given a plate of some of these appearances, and the preparations I shall at all times be happy to shew to any of my professional brethren who may wish to see them.

But in speaking of fractures of the neck of the thigh-bone within the capsule of the joint, I have been necessarily led to

describe those which are external to it, as well as that to which the trochanter major is subject; and as the descriptions which I have given have been objected to, it is proper I should examine these objections in detail.

But first let me observe, that I did expect an experience of near forty years would have been attempted to be contradicted by numerous dissections of these cases, and by experiments upon living animals, as these are the only modes by which the point can be determined.

Is it a fact, or is it not, that fractures of the neck of the thigh-bone generally unite by ligament? No argument can ever settle the question; it is to be decided only by observation.

Is it a fact, or is it not, that fractures of the neck of the bone, external to the capsule, and into the cancelli of the trochanter, and the other species of fracture at this part, viz., that through the trochanter major, unite by bone? Dissection and experiment only can prove or disprove it.

I shall now proceed to an analysis of the work in question, and first examine the correctness of its anatomy.

Speaking of the head of the thigh bone, the author says, page 2, "It (the head of the bone) is covered in the recent state with "cartilage, excepting at its centre, where there is a depression for "the interarticular or round ligament."

Now, I state, that this depression is not at the centre of the head of the bone, in which I am sure every anatomist will agree with me; and the best physiological reason may be given why it is not seated where the author says it is to be found.

Speaking of the round ligament he says, page 7, "This liga-" ment is so disposed that luxation of the femur on the obturator " foramen is the only one which can happen without rupturing it."

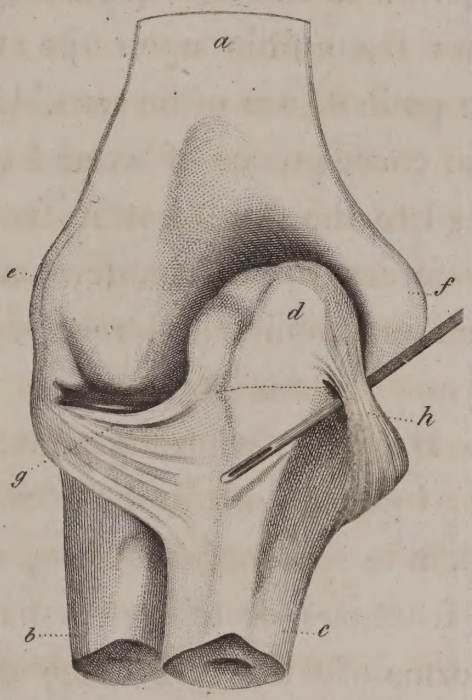
If it be meant that when the muscles and capsular ligament are removed, the head of the bone can be drawn over the edge the acetabulum towards the obturator foramen, every tyro in anatomy knows it; but if it be intended to state from this structure, that the dislocation in the obturator foramen, happens without rupture to this ligament, dissection proves that such opinion is erroneous.

He says, page 158, "What ligamentous band Sir Astley " alludes to, I am rather at a loss to understand."—"I have not been " able to detect any distinct ligament on dissecting the joint, nor " do I find any such mentioned by Soemerring, or any other " author."

If the author will have the kindness to call upon me, I will shew him as follows:—A band of ligamentous fibres crossing from the side of the coronoid process to the olecranon; and upon the radial side of the ulna, the upper portion of the coronary ligament of the radius passing from the side of the olecranon towards the neck of the radius. If the olecranon be broken off, and these ligamentous fibres be left entire, the olecranon will remain still united to the

ulna by means of these ligamentous productions, which I should not have noticed but for their influence on fractures of this bone.

A. Os humeri.
B. Radius.
C. Ulna.
D. Olecranon.
E. External condyle of the os humeri.
F. Internal condyle.
G. Coronary ligament, the upper part of which ascends towards the olecranon.



H. Ligamentous fibres from the coronoid process to the olecranon. If the olecranon be broken off at the dotted line, and the upper part of the coronary ligament, and these ligamentous fibres remain entire, the bone moves laterally, but it separates little from the ulna.

Cause of the Fracture of the Neck of the Bone within the Capsule.—It is said, page 20, "That it must be broken by a "contre-coup, either by a fall on the trochanter, the feet, or "knees: the former of these is by far the most frequent cause."—"Dessault says, that, in his practice twenty-four cases in thirty "were produced in this way."

These observations are quite contrary to my experience, for fractures of the neck of the thigh-bone within the capsule, have been often produced by violence which acted perpendicularly; or they have been occasioned by a sudden rotatory motion of the

pelvis upon the thigh-bone; the violence produces its effect by acting with the advantage of a lever upon the neck of the bone, but in fractures external to the ligament, they are produced generally by severe blows from falls upon the trochanter itself; in the former case, the patients are often sensible of the injury before they fall, and fall in consequence of it, and therefore, the accident is commonly imputed to the fall; but in fractures external to the ligament, the blow forces the trochanter towards the neck of the bone, and the trochanter splits and receives the cervix into its cancelli.

With respect to Dessault, whose practice, for a short time, I had an opportunity of witnessing, and for whose character I have the highest respect, like some of our English surgeons, he confounded the three fractures of the upper part of the thigh-bone, under the general terms of "fracture of the neck of the thigh-bone."

To proceed. Our author says, page 22,—"*Diagnosis.*—Where "a person, previously in full possession of the locomotive powers "of his limb, after the receipt of any injury, and particularly a "fall upon his trochanter, becomes suddenly deprived of that "power; accompanied by a remarkable consciousness of incapa-"city in the injured member; and when, from the position and "direction of the limb, it is obvious that there is no dislocation, "a strong presumption must arise that a fracture has taken "place."

Again, page 23. "I cannot quit this subject without depre-
"cating, in the strongest terms, the cruelty and impropriety of what
"is termed satisfying yourself that there is a fracture, and its
"precise situation."

Page 24. "To return, then;—This symptom of a total and
"sudden privation of the power of motion, after a fall on the
"trochanter, should always be regarded as diagnostic of a fracture."

Good God! is this written by an English surgeon? in the land of John Hunter, the minute investigator of nature, whether in health or disease? This is, indeed, cutting the gordian knot! What! shall not the surgeon satisfy himself there is a fracture, and its nature, before he exposes his patient to a confined position of great duration? for, if the surgeon be not suffered to examine the limb, when is that confinement to terminate? Are such doctrines to be taught, such advice to be given to young men just embarking in their profession, that they need learn nothing of these cases? *For if a man has a fall, and a consciousness of inability, his limb is decided to be fractured!* Certainly it will save a great deal of time in studying the profession, and a great deal of trouble in knowing the nature of the case the surgeon is called upon to treat.

If the advice which the author has given in the foregoing quotations, is adopted by young men, who come to London for instruction, when they return into the country, to settle in practice, they would all be ruined.

I shall give the following case in illustration:—

When young in practice, in the city, I was asked to visit a person who, I was informed, had a fractured leg: I found him sitting by the bed side, with some splints upon the floor, which he had removed from his leg. He said, "I wish you would examine my leg, and see if it be broken." I did so, and perceived a swelling on his tibia, above the middle of the bone, which had arisen from a very severe blow: I said, "This is not a fracture, but merely a bruise, with considerable extravasation of blood." He then informed me that he had received the injury near a fortnight before, and when raised from the ground, being unable to bear the weight of his body upon the limb, sent for a surgeon, who pronounced his case to be a fracture,—bound up his limb in splints,—and left him to a comfortable repose of six weeks in bed.

In the morning on which I saw him, his bed having become uneasy to him, he had been lifted from it, to a chair by its side, whilst his bed was making. Finding that his leg was not painful, he was induced to put it down, to discover if he could bear upon it; and, being able to do so, he removed the splints, and sent for me. When informed there was no fracture, he was exceedingly irritated against his surgeon, and threatened a prosecution for loss of time, of business, and, consequently, of property, produced by this confinement; but I pacified him, and wrote to the surgeon to go immediately, and the matter was concealed from the public eye, and amicably adjusted.

But I would ask any of my professional brethren, whether such a man did not deserve severe punishment for his ignorance, or the very careless examination he made of the injury?

I have been several times consulted respecting cases of undiscovered fractures and dislocations, and for others supposed to exist, which had never happened; and have long since learned not to give my opinion to a patient, but to convey it by some other means to his surgeon, that I might not injure his reputation; but if such doctrines as these were promulgated and adopted, I should be entirely occupied in concealing the mischiefs which they would produce on the character of professional men.

I would also ask any medical man who has had an opportunity of seeing much practice, if he has not witnessed cases in which persons, by a fall upon the hip-joint, have been unable to stand upon, or to move that limb; but who, in a few days, by the use of crutches, had recovered its powers, and used it as well as before?

In page 84, it is said, "*Now, if the generality of Sir Astley's "patients, and particularly those in Guy's Hospital,* have had "all these indications of fractures demonstrated upon their per- "sons, it is not difficult to understand the shortening of the "limb, and destruction of the fibrous periosteum, which he has "found in fractures within the capsule."

With respect to my own cruelty or inhumanity, *particularly to the patients in Guy's Hospital,* God forbid that I should be the advocate of a cruel, coarse, or unnecessary examination, and no one has a right to accuse me of it; all I have recommended

may and ought to be done with gentleness; ask my greatest enemy, and let his answer decide, whether the poor of London, and the patients in Guy's Hospital, are or are not, anxious to place themselves under my care; but I have here to observe, that those who shoot at random must take care they do not wound themselves;—this is well exemplified in the production I am analysing; for, if I were disposed to be severe, what inferences might not be drawn from the following case of fracture of the neck of the thigh-bone, given in that work, page 30.

"Daniel Spilling, forty years of age, was brought into St. "Bartholomew's Hospital in November, 1820. He stated, that, "as he was walking in the street, his foot slipped, and he fell "on his right hip. He got up, but was totally incapable of "moving, or bearing any weight on the affected limb. His clothes "were taken off, and whilst he was in the erect posture, no "difference whatever could be detected, either in the length or "position of the limb, *which admitted of being moved with con-* "*siderable freedom in every direction*, and with less pain than is "usual in fractures. On placing him in bed no deformity was "manifest; and, in consequence of the doubts which were en- "tertained of the existence of fracture, the limb was *examined* "*with great freedom, and for a considerable time.* He was directed "to lie on his right side, with the thigh bent on the pelvis. This "position gave him great pain in the hip, and *soon became intoler-* "*able, from the uneasiness it caused in the region of the liver.* "His health was greatly deranged at the time of his admission,

" and he became completely jaundiced. *Very little attention was* " *paid to the limb,—his health became daily worse,—and he died* " *on the eleventh day after admission.*"

For the world I would not, if I were able, say any thing which could lessen the character of St. Bartholomew's Hospital, or hurt the feelings of any of its medical officers. I know well the excellence of the Institution, the admirable manner in which it is conducted, and I live, and hope to live, in harmony with its surgeons; but I cite this case from the work before me, to shew that attacks upon the character of an Hospital, and of an individual connected with it, might lead to retaliation; but, if I could stoop to do so, I should consider it as bad taste. The rivalship of hospital surgeons ought to consist in, who should most advance the science of his profession, and who should exert himself the most in lessening the sum of human suffering.

It was probably from want of sufficient attention to a careful examination of an accident, which led our author not to discover a fracture of the olecranon until the sixth morning after it had happened:—see pages 144, 145. For he says, page 146, " I now (on the *sixth* morning after the accident), most distinctly ascer- " tained that the olecranon was fractured." Surely this ought to have been discovered earlier.

The next point upon which our author differs in opinion with me is, respecting the shortening of the limb in the fracture of the neck of the thigh-bone within the capsule, which he considers as

being less than I have mentioned. I have stated it to be from one to two inches shorter than the other limb; and, from having since seen a case in which it was more than two inches, I extended it to two inches and a half. But, instead of this statement being greater than it ought, I have now to add, that in Mr. Langstaff's collection there is a preparation of the fractured neck of the thigh-bone within the capsule, taken from a man named Campbell, aged 82, in whom, Mr. Langstaff assured me the shortening was four inches; and, to convince me of this, he sent for the shoe which the man had worn after his accident, and which I measured: the heel of the shoe was two inches and a half in thickness, and he wore some pads in the shoe, which raised his heel one inch and a half higher to bring it even with the other leg; therefore if I were to alter the sentence, it would not be in the way our author wishes, but by making the utmost difference in length four inches. The usual state is, that the heel of the injured limb rests in the hollow between the malleolus internus and tendo achillis of the other leg. I know that there are examples in which the limb has been shortened only half an inch, but these are exceptions to a general rule, and they depend upon the mode in which the fracture has happened; for a fork is sometimes formed in the trochanter minor, which receives the neck of the bone, and prevents its further descent *(See plates)*.

In the fracture of the neck of the thigh-bone external to the capsule,—when the trochanter splits, and the neck of the thigh-bone is received into its cancelli, the degree of shortening of the limb

is very slight, for it rarely reaches an inch, and is from half an inch to three quarters only. The reason for this is at once seen, by those who understand the anatomy of the part, and the nature of this fracture, for the head of the bone passes outwards more than it descends.

Since the publication of the former edition of my work, I have inspected, with Mr. Key, a fracture of this kind. The moment I had examined the patient, I pronounced the case to be a fracture external to the capsule, and was led to believe so from the limb being a little shortened; from the ecchymosis which attended it; from its distinct crepitus without any rotation; from the diminished motion of the upper part of the thigh; from the sunken state of the trochanter; and from the smallest motion giving great pain. This man died in a fortnight after his accident.

When the body was placed upon the table for examination post mortem, all the limbs were rigid from the fixed contraction of the muscles, and, consequently, the thigh was drawn up to its greatest possible extent; when the limb was found to be not quite three quarters of an inch shorter than the other. The posterior part of the sheath of the vessels, and some branches of blood vessels, were torn by the bone, which accounted for the ecchymosis. The neck of the bone was forced into the cancelli of the trochanter major. Before writing this statement, I again asked Mr. Key the degree of shortening of the limb, and his answer was, "If you mention three quarters of an inch you will state rather more than its degree of retraction, even when all

the muscles were contracted to their utmost rigidity." I shall be happy to shew the parts which I removed from this case with all the surrounding muscles, to any person who wishes to see them, as they at once explain the nature of the accident, and why the limb is so little shortened.

I am also attending a gentleman at the present moment, who has met with this injury, in whom the shortening of the limb does not exceed half an inch.

In transverse fractures of the trochanter major I have seen the thigh-bone very little shortened, and sometimes not at all; but there will be occasional exceptions to this rule, when the muscles are extensively torn. I have given in one of the plates a view of the trochanter major, broken and united.

In proof of this slight diminution in length, in some instances, I beg to refer the reader to the case of Mr. B——, near Reading (as related in my work by Mr. Harris, with whom I attended), in whom there was not the least shortening of the limb, but one portion of the trochanter fell at some distance behind the other: the fact is, that these cases have been constantly mistaken for each other, and thus the symptoms of one species of injury have been given to the other. But when the trochanter is broken below the insertion of the principal rotatory muscles, and the surrounding muscles are much torn, there is a great shortening of the limb; and a very considerable degree of deformity ensues.

From reading my account of a preparation, contained in Mr.

Langstaff's excellent Museum, of fracture of the neck of the thigh-bone within, and another external to the capsular ligament, it is said in the work before me, page 40, "I was led to make a very "particular examination of this preparation, and the inferences "which I draw from such examination are very different to "those at which Sir Astley has arrived."

The only conclusion I drew was, that the one unites by bone, and the other by ligament.

He says—"In the first place, I observed that the fractured "surfaces within the articulation were very accurately opposed to "each other, and, consequently, that very little shortening could "have taken place."

To this I answer, that not one word was said respecting their being opposed to each other or not, and therefore no conclusion was drawn by me about it; and as to ascertaining the shortening of a limb, preserved in a glass, and separated from the surrounding bones and muscles, no correct opinion could thus be formed upon the subject.

"Secondly:—I perceive that very firm ligamento-cartilaginous "union had taken place."

I would ask, is this the *ossific union* for which the author contends? The truth is, that I have seen a number of cases of fracture of the thigh-bone within the capsule, but, as will be seen in the plate, never less union, even by ligament, than in this preparation. Mr. Langstaff is a most liberal man, and will be happy to shew the preparation to any person anxious to see it. *(See plate.)*

" Thirdly:—It was evident, that a considerable portion of the " reflected membrane was not torn through."

I have drawn no conclusion from the preparation in that respect; but I could wish Mr. Langstaff to be asked if any portion of the reflected membrane remains.

" Fourthly:—It appeared very clear, that the fracture within " the articulation, would prevent the motion of the pelvis from " being communicated to the fracture external to the capsule."

I do not see this; the motion of the pelvis must be communicated to the insulated portion of bone through the medium of the capsule.

Here then the conclusions are entirely the author's, and not mine; for I drew no other than that the internal fracture did not unite, and that the external united; and with respect to the accuracy of description, I wish the reader to consult the preparation, as well as plate 11, which is a faithful representation of it.

Of the Age in which this Fracture occurs.

The period of life at which fractures of the neck of the thigh-bone within the capsular ligament, generally occur, is a most important consideration; and as it is one on which the practice of the surgeon very much hinges, I shall take the liberty of making the following statement.

I have now been thirty-nine years at St. Thomas's and Guy's Hospitals; and, for thirty years, have had more than my share, and much more than I merited, of the practice of London. We have eight hundred and fifty patients in our two Hospitals; and I believe that, in the two hospitals, eight cases of fractures of the upper part of the thigh-bone occur in each year; but, in order to prevent my exceeding the average number, I will consider them only as five per annum; thirty-nine, multiplied by five, produce one hundred and ninety-five; add to these one case only in each year, in my private practice of thirty years, they will collectively amount to two hundred and twenty-five cases; now, in that time, I have only known *two cases* of fracture of the neck of the thigh-bone within the capsular ligament *occur under fifty years of age;* one was in a patient aged thirty-eight, who had an aneurism of the iliac artery; and the other has been kindly shewn to me by that excellent anatomist, Mr. Herbert Mayo. Our author states that he has "examined, post mortem, three fractures of the neck "of the thigh-bone within the capsular ligament in young people." I shall request permission to examine these rare and curious cases, which our author has no doubt preserved. The inspection of all the preparations alluded to in this work is at his service, but I confess that I fear some mistake may have arisen in our author's cases, from the following circumstance: —

There is in the Museum of the Royal College of Surgeons, a preparation bearing this superscription. "Supposed fracture of "the neck of the os femoris within the capsular ligament united

"in a girl five years old. By Mr. Henry Earle. 1818." Mr. Wilson, Professor of Anatomy and Surgery to the Royal College of Surgeons, said of this, and another preparation in the Museum, in one of the Lectures he delivered at the College, June 2nd, 1820. "I have examined very attentively these two preparations, and *cannot perceive one decisive proof*, in either, *of the bones having been actually fractured.*" I shall draw no inference from this statement, but leave the reader to form his own opinion upon the subject, only observing that I trust the three cases bear no resemblance to that in the College Museum.

But I come now to a part of the work in which I have to complain of misrepresentation; and while I feel assured that this must have been unintentional, I am very glad that the matter is here so much condensed, that it is very easy for me to make a reply. After giving an account of the fractures external to the capsule, so far as I have observed them, I have stated that they occur under fifty years of age; but I also expressly say, "*that they occur in advanced age,*" and give three cases which shew that they do:—yet our author, speaking of these cases, chuses to say, "And this is all the evidence adduced to prove that fractures "external to the capsule occur in early life,—that they are the "result of great violence,—that they are not shortened,—and "that they are capable of ossific union."—Page 56.

To the first, I have to state, that I have mentioned that fractures external to the ligament *occur under fifty years of age;* a great number of these cases which have fallen under my notice, have occurred under that period, and, therefore, a surgeon called to the bed-side of a patient who has an injury to the upper part of the thigh-bone, if he finds the age of the patient to be under fifty years, will, with a very rare exception, be correct in his judgment, if he concludes it to be either a fracture just external to the ligament, or one through the trochanter major. But I also mention that *both fractures occur in age,* and therefore no conclusion can be drawn between the two, in advanced age, but by the most careful examination. The three cases which I have given clearly shew this. If I had said these fractures external to the capsule only occur under fifty years of age, our author would have had some foundation for his remarks.

I have stated that fractures directly external to the capsule, arise from greater violence than fracture within the capsule; for my experience has taught me, that a very slight accident generally occasions thefra cture within the capsule, and a violent blow, or fall, the other: the first is an accident upon which the fall often succeeds, the other is generally the consequence of that fall; many of those within the capsule which I have witnessed, were produced by the person's slipping from the curb-stone to the road-way,*—not that I mean to deny, that a fall will, and does

* Slipping from the curb-stone to the road-way produces a violence in a perpendicular direction; falling against the edge of the curb-stone produces often the fracture external to the capsule.

occasionally, produce a fracture within the capsule, or that in a very old person, a fracture may occasionally happen in any part of a bone, from, comparatively, a slight cause to that which produces it in the young.

It is also said, that "I have observed they are *not* shortened;" whereas, I have expressly said, "*The limb is shortened*, but not to the same extent as in the internal fracture, for the difference in the length of the limbs rarely amounts to an inch; its extent depending upon the obliquity of the fracture, and upon the degree of laceration of the surrounding parts admitting of a greater or less retraction of the muscles."

It is further said, "That I give no other evidence of the frac-" tures external to the capsule, and those through the trochanter, " being capable of ossific union." How could such a statement be made, when I have given three plates of the ossific union of the cervix external to the capsule, and one of the trochanter united. (See the plates in the first and second edition of my work on Dislocations and Fractures.)

I have said, "That if the broken extremities of the bone, in any part of the body, be kept much asunder, ossific union is prevented;" but, as our author says "that the correctness of this " statement is very questionable"; to shew how questionable it is, I hope to be able to give in this appendix, or, at all events, shall do

so in the third edition of my work, five different examples of non-union of the bone, produced by this cause. But I well know that two and three inches of the os femoris or os humeri may be removed and the bone unite, if its broken ends are suffered to be drawn together by the action of muscles.

In confirmation of the correctness of my remarks, I insert the following communication from Mr. Benjamin Bell, of Edinburgh.*

26, St. Andrew Square, Edinburgh;
August 7th, 1823.

My Dear Sir,

Excuse the freedom I take in communicating to you the outline of a case, the result of which I had an opportunity of observing a short time ago—as it is connected with the subject so admirably developed in your late valuable publication, it may, perhaps, prove interesting. In the progress of a tour through some parts of Cumberland last month, I had occasion to visit Whitehaven; Mr. Fox, an able and intelligent surgeon, of that place, was so kind as to shew me the case already alluded to. He was also so good as to favor me with an account of its progress.

June, 1822.—William Coulthard, aged thirty-five, of a plethoric habit, a miner, while stemming a bore, preparatory to blasting a

* A highly respectable and intelligent individual, grandson of Mr. Benjamin Bell, who was a most useful man to the profession by his publications: and son of Mr. George Bell, also a most able surgeon, of Edinburgh.—Mr. Bell is likely to be a worthy successor to such a father.

rock, the powder, in consequence of the friction, inflamed, and exploding, gave rise to the following accident:—One portion of the rock struck him in the perineum, and occasioned a compound fracture of the tuberosity of the left ischium, which was followed by profuse hæmorrhage. Another portion of the rock came in contact with the left leg, about four inches below the knee, and shattered the tibia and fibula. Four large loose pieces of bone were extracted (by Mr. Fox) immediately after the accident. These portions, when united, formed about *six inches* of the entire cylinder of the tibia. The sides of the wound were then drawn together, and retained "in situ" by adhesive plasters. The limb was placed in a proper position, and secured by pads and wooden splints. In a short time the wound in the leg healed up; three months, however, after it had healed, an abscess formed, and another small portion of bone came away, probably a part of the fibula. The wound healed again without any untoward symptom.

On the day on which I saw him (July 22nd, 1823), the leg in which the injury had occurred appeared to be about two inches shorter than the other. A large cicatrix occupied the fore and middle part of the shin; the patient could extend the leg and stamp on the floor with considerable force; the muscles were plump and firm; but the leg was to a certain extent flexible, and could be slightly bent by the hands in four different directions: backwards, forwards, to the right and to the left, on seizing it below the knee (and above the fracture), and at the ancle. He suffered no pain, and permitted the limb to be freely handled,

but could not, at that time, bear the whole weight of the body upon it. It seemed to me as if the space between the two ends of the fractured bones had been filled up with a sort of ligamento cartilaginous matter, resembling that found in cases of fracture of the neck of the femur, external to the ligament, or in that occurring in illtreated cases of transverse fracture of the patella. Whether that conjecture is right or not, it is difficult to determine.

A number of small pieces of bone have been extracted from the wound in the perineum, and a pretty large loose portion can be felt at present with the probe. In other respects the man's health is good, and he expresses an anxious desire to return to his work.

Your much obliged,
And sincerely grateful Pupil,
BENJAMIN BELL.

Mr. Dunn, an intelligent surgeon at Scarborough, has sent me the cast of a leg, in which the space between the broken end of the tibia and fibula is nearly filled by bone. In the third edition of my work I intend to shew the result of some experiments, which will explain this case.

The next subject, in the work I am analyzing, upon which the author raises a doubt is, whether there be an increased quantity of synovia secreted into a joint, which is subject to an irritation

from a fracture extending into it; he, however, at once removes the difficulty himself, by giving a dissection of his own, in the case of Spilling. "On puncturing the capsule, about *an ounce of* "*bloody synovia* escaped; and the introduction of the finger "readily detected a fracture of the bone." With equal reason he doubts if this fluid would separate the broken bones, and he illustrates this by a supposed experiment with an inflated and distended bag; which experiment, cannot illustrate the morbid extension gradually produced in the ligament by the continued pressure of accumulated synovia. Every one in practice must have seen the knee under extension of its ligaments, from an increased secretion of synovia, with its bones so loose and separated that it will not support the weight of the body.

I am asked candidly to state, if the force which produces these fractures of the upper part of the thigh-bone ever occasions dislocation? To this I answer, that very little force is often sufficient to produce dislocation. It is the direction in which the force is applied, and the muscles being unprepared for resistance, and not the violence of the accident, which is the cause of dislocation.* A case will be seen in my work, of dislocation of the thigh-bone upon the pubes, produced by a person walking across a paved yard, where one of the flag stones had been taken up. I have also known a dislo-

* See history of the execution of Damien, in my work on Dislocations and Fractures of the Joints.

cation of the thigh-bone upwards, produced by the foot being caught in the doubling of a carpet whilst the person was crossing the room. With respect to other joints,—who has not seen a dislocation of the os humeri produced by very slight accidents? and a few days ago I was consulted for a dislocation of the astragalus, with fracture of the fibula, produced by treading on a cable, and the accident was considered by the patient, in the first instance, only as a sprain.

The next observations relate to my experiments on animals, which prove that the head of the bone, even in healthy animals, will not unite with the cervix; and which are objected to upon the ground that they were compound fractures. Now these fractures were not compound in the true sense of the word, for they were united by adhesion and not by granulation; the wound which was made through the integuments was valvular, and healed immediately. A compound fracture unites by granulations, and a simple fracture by adhesion; but here the external wound almost immediately adhered, and, consequently, it did not heal by granulation. They are also objected to on the ground of the ligament being cut through. In one of these experiments the capsular ligament was opened: in the other it will be seen it was not: both were broken by a blunt instrument. The two preparations which I have preserved, were the only examples in which

the experiment was complete; but I made a great number of others, in which the fractures continued compound; and in each of these, the head of the bone either became absorbed, or was discharged by ulceration, and I never could succeed in uniting the head to the neck of the bone. I have since divided the neck of the thigh-bone in a dog, and the head of the bone was three-fourths absorbed. By way of contrast, I have since divided the bone externally to the capsule, in five instances, and have preserved the bones; the wound united by adhesion, and every bone has been healed by ossific union; the natural inference is, that fractures within the capsule, do not unite by bone, but the fractures external to it readily do so. As to the bearing upon the limb, or its weight having any influence to prevent union in these animals, I have only to observe, that the muscles become contracted, the limb drawn up, and the animal cannot bear upon it for several weeks.

My friend, Mr. Brodie, has furnished me with the following account of an experiment he made, and which fully confirms my observations.

Dear Sir,

The circumstances of the experiment, which I mentioned, were briefly these:—The tibia of a guinea-pig was broken at the lower end. A month afterwards the animal was killed. On dissection I found a fracture extending across the tibia, transversely, and so close to the ancle-joint, that it was situated at that part of the bone which is covered by the reflected layer of the synovial membrane.

The synovial membrane itself, and the ligaments of the joint, appeared to have been very little injured, and the broken surfaces had remained in good apposition; nevertheless, there was not the smallest union of them, either by bone or ligament, and there had been no formation of callus round the fracture. The bone in the neighbourhood of the fracture, had become compact and hard, in consequence of the ossification of the medullary membrane lining the cancelli.

I am, Dear Sir,

Saville Row, Your's truly,

August 16*th*, 1823. B. C. Brodie.

As to Mr. Colles, who has never seen a fracture of the neck of the thigh-bone united, and every line of whose writings shew that he is an excellent anatomist and an intelligent pathologist, I confess it gave me pleasure to find him making a statement from accurate dissections, which accords with all I have observed in the last thirty-nine years; and further, I was gratified that his enquiries must lead to the same conclusions, because a few contributions of a similar kind, from the ardent pursuers of morbid anatomy, would soon prevent patients from being *tortured with trials*, which have been *frequently repeated*, and *found to be uniformly unavailing*.

My belief is, that it is wisely ordained by nature, that this, and

the other bones I have mentioned—the patella, olecranon, and extremities of the bones within the articulations, should not, as a general rule, unite by bone; for I find that if the neck of the thigh-bone be shortened, and falls towards the shaft of the bone, the person is unable to move his hip-joint, and becomes, what is vulgarly called, bed-ridden; the cause of this is easily explained: for when the cervix is shortened, the trochanter falls upon the acetabulum, and the play of the thigh-bones become destroyed. In an ossific union of the cervix femoris, if such should ever occur, as the neck of the thigh-bone is greatly shortened very soon after the accident, the same effect would be produced, and the play of the limb be destroyed; more especially when the callus, by which the union would be produced, must occupy a considerable part of the acetabulum, and the patient's state would probably be much worse than in that of ligamentous union.

It has been said, that I have a strong prejudice upon the subject of union of the fractured neck of the thigh-bone, but this I cannot allow. When I began practice, I made use of all "appliances and means to boot" to produce an ossific union, but finding I could not succeed in a single instance, and that my patient's suffered not only in health, but from sloughing sores upon the back, which sometimes destroyed them, I gave up the attempt, and now aim only at tranquillizing the parts to

prevent inflammation, and thus lessen the danger of the injury; and I endeavour, as soon as possible, to restore to the patient an useful limb by crutches,—by a high heeled shoe,—and by the aid of a stick,—until he can walk without one.

I have witnessed the practice of Mr. Cline, Mr. Chandler, and Mr. Birch; of Mr. Warner, Mr. Lucas, Senr., Mr. Forster, and Mr. Lucas, Junr., in our two hospitals of St. Thomas's and Guy's, and I have seen the practice of a great number of surgeons in London, yet I never saw one of these gentlemen succeed in uniting a fracture of the cervix femoris within the capsule, although all variety of means were tried which their minds could suggest. Were these surgeons all prejudiced?

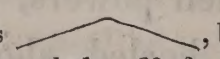
The treatment which ought to be pursued in fractures of the upper part of the thigh-bone is as follows:—

In fractures within the capsule, the limb is to be placed over a pillow, bent under the knee, from a fortnight to three weeks, until the inflammation in the joint, and the irritative fever have subsided; and when the patients are able to rise, the sooner they use crutches the better, because the more quickly do they recover. They are to bear gently on the foot at first, and gradually more and more, until the ligament becomes thickened and the muscles increased in their powers, so as to enable them to walk with a stick: a high heeled shoe is next advised them, by which the

halt is much diminished; and then, if the person be not of great weight, the stick may be discontinued.

In fractures of the neck of the bone external to the ligament, when the cervix is thrust into the trochanter, the mode of treatment consists in placing the patient over the double inclined plane,* and a band or girt is to be buckled around the pelvis, over the trochanter, to keep it pressed towards the neck of the bone; and thus they are held together until union is effected. I have, however, seen these fractures, when the girt is applied, do equally well in the extended position of the limb, as when placed over the double inclined plane, and in this respect I generally consult the patient's feelings.

In fractures of the trochanter major a different plan must be pursued:—in this case, when the person is recumbent, the broken trochanter of the shaft will be found to have separated from the trochanter of the neck of the bone, and it is necessary to place a thick leather pad under the trochanter, to keep it elevated, so as to approximate the broken portions, or the bone will not unite. In Mr. Harris's relation of Mr. B——'s case, near Reading, not the least union was produced until this mode of treatment was adopted, although he had been kept in bed from July the 20th, to September the 11th.† I agree with our author that the fæces should be easily removed, and a portion of the mattress should draw out for that purpose; and this is readily done in any common bed.

* This can be easily made with two pieces of board, thus  , by any Carpenter.

† See case, page 159 of the Second Edition of my Work, and plate 30, for the bandages used.

I now come to the author's proofs that fractures of the neck of the thigh-bone within the capsule unite by bone.

The first is the following: page 95:—"By dissection, also, "I have proved that union has taken place within the capsule, "and that so firm and rigid as to be inseparable even after "maceration, and which required boiling for a considerable time "before it could be overcome.

"The following are the particulars of the case in which this "occurred:—One of the nurses belonging to the hospital, aged "seventy-four, was knocked down in the street by a horse, and "fractured the neck of the thigh, in the year 1808. She was an "old emaciated woman, and had been much addicted to drinking. "I did not attend her until nearly three weeks after the accident, "when I found the limb retracted and foot everted. Very little "attention had been paid to her during this interval. By gentle "and continued extension I drew down the limb nearly to its "proper length, when a very evident crepitus was perceptible. "The limb was maintained in this situation by means of a splint, "of a peculiar make, which I had constructed for cases of this "description, and which I shall mention hereafter. The patient "was placed on a double bed, which admitted of her passing "her motions without moving the pelvis. She was kept in this "position for seven weeks, when the apparatus was removed. "She had an old ulcer in her leg, which the peculiar construction "of the splint admitted of being dressed daily without inconveni-"ence. She was allowed to move the limb about in bed, and

" at the end of a week was permitted to rise for a short time. " Considerable œdema of the leg took place, the wound became " irritable, and erisypelatous inflammation spread up the limb, " and eventually carried her off: she died exactly thirteen weeks " from the receipt of the accident. On examination, two fractures " were found; an oblique one extending through the greater part " of the trochanter major, which was split into two portions, and " reaching to the trochanter minor: the other a transverse " fracture within the articulation. Both of these had very firmly " united, as it was believed, by bone; *but as much discussion arose* " *out of the case it was submitted to the test of boiling, when* " *the union became loosened;* prior to which no force that was " applied could move one portion from the other. The obliquity " of the neck was lost in this case, and the limb shortened about " three quarters of an inch. Had the patient lived for some time " longer, there is every reason to believe that the union would " have been still more consolidated."

Here then we see a case supposed to be united, about which disputes arose whether it was united or not, and at last by boiling the bone *it was proved that the bone separated,* and that, consequently, *it was not united by bone.*

The next case of the author's is from a Mr. Erndleus, a Dutchman, page 97:—" A very interesting case of bony union and " osseus deposit within the articulation is recorded by Christopher " Henry Erndleus.* The following is the description which he

* " Relatio Itineris Anglic et Batav. p. 86."

" gives of the nature of the accident:—' Collum vel cervicem
" ossis femoris a violentiâ externâ frangi frequentius accidit, quam
" a plerisque creditur; ossea autem vel vitrea (uti à quibusdam
" appellatur) lamella in hâc parte tenuissima est, et quamvis com-
" munis sit opinio, ubi patientes de dolore et motu abolito in his
" partibus conqueruntur, exarticulationem vel luxationem ossis
" ischii accidisse, falsa tamen, imo propter incredibilem ligamen-
" torum ac tendinum circumjacentium crassitiem ac robur, im-
" possibile exarticulationem tali modo luxari. Talem fracturam
" his meis oculis vidi et manibus palpavi in cadavere fœminæ
" nosocomei muliebris Amstelodamensis sociæ in quâ tractu tem-
" poris, fractura illa cervicis ossis femoris dextri per callum coalu-
" erit iterum, fœmina tamen exinde per omnem ætatem ad mortem
" usque clauda. *Callus pollicis latitudine sub ipso capite magno*
" *ossis femoris extabat, nulla autem in ligamentis ac tendinibus*
" *musculorum læsio vel præter naturalis constitutio erat.*' "

How hard a man must be driven for his proofs, to build his opinions upon such a person as this! Our author says of him, " *He runs rather into the extreme,* in supposing that a dislocation " of the thigh cannot take place, and he accounts for it on a " wrong principle."

" *Rather into the extreme!*" What does our author mean? And yet this person is brought forward as a judge and umpire of injuries of the neck of the thigh-bone!

The third proof of the union of the fracture of the neck of the thigh-bone is from the preparation of Mr. Stanley, upon the subject

of which some observations are required. For Mr. Stanley I have great respect; I know him to be well founded in anatomy, and excellently qualified to make a good surgeon.

The description which our author has given of this case is defective in two very essential points. In the first place, he does not say that in one of them the appearance of fracture was external to the capsular ligament, and, therefore, not applicable to his object.* Secondly, he does not mention any thing of disease which existed in other joints.

I do not mean to deny the possibility of the necks of both thigh bones in this subject having been fractured, because that point can only be determined by the history of the accident, and by a very careful and accurate examination of several sections of the bones; but I can shew that similar effects are produced by disease.

The neck of the thigh-bone, in adult persons of middle age, has a close cancellated structure, with considerable thickness of the shell which covers it; but in old subjects, the cancellated structure of the shaft of the bone, which is formed of a coarse net work, loaded with adipose matter, is often extended into the neck of the bone, and the shell which covers it becomes so thin, that when a section is made through the middle of the head and cervix, it is found diaphanous; of this I have several specimens. As the shell becomes thin, ossific matter is deposited on the upper side of the cervix, opposite the edge of the acetabulum, and often a similar portion at its lower part, and thus the strength of the bone is in some degree preserved: this state may be frequently seen

* The author says, "that the fracture on the right side was entirely within the articulation, and on the left side partially." My memory may deceive me, but if I rightly recollect, the appearance begins between the trochanter major and capsular ligament above, and it extends to the insertion of the capsular ligament below. If this were fracture, and not a change from disease, upon my own principles, union would be readily effected, beginning, as it would, externally to the capsule.

in very old persons. Mr. Steel, of Berkhampstead, one of the most intelligent surgeons, and most respectable men I know, gave me the thigh-bone of a person thus altered whose age was ninety-three. When the absorption of the neck proceeds faster than the deposit on its surface, the bone breaks from the slightest causes, and this deposit wears so much the appearance of an united fracture, that it might easily be mistaken for it.

Before the bone thus alters we sometimes meet with a remarkable buttress shooting up from the shaft of the bone into its head, giving it additional support to that which it receives from the deposit of bone upon its external surface.

But another change is also produced from disease, of which the following is the history, and which directly applies to the subject before us :—

Old bed-ridden and fat persons (generally females), are often brought into our dissecting room, with some of their bones broken (and more frequently the thigh-bone than any other) in being removed from the grave. If the cervix femoris of such persons be examined, it will be found that the head of the bone is sunken down upon its shaft, and that the neck of the thigh-bone is shortened, so that its head is in contact with the shaft of the bone opposite to the trochanter minor ; and at the part at which the ligament is inserted into the neck of the bone, the phosphate of lime is absorbed, and a ligamento cartilaginous substance occupies its place ; either extending through the whole neck of

the bone, or partially, so that one section exhibits signs of it, and in another it is wanting. The bone, in some cases, is so soft and fragile both in its trochanter and head, that it will scarcely bear the slightest handling: the motion of the thigh-bones in the acetabulum is almost entirely lost, so that the persons could have little use in the lower extremities.

During the last winter we had two instances of this alteration in the neck of the bone, and it is an appearance I have several times seen.

In examining the body of an old subject, very much loaded with fat, in the dissecting-room of St. Thomas's Hospital, I found that the gentleman who had dissected one limb had cut through the capsular ligament of the hip-joint, and tried to remove the head of the thigh-bone from the acetabulum, but the neck of the bone broke under the employment of a very slight force; and, upon a further trial to remove it, the bone crumbled under his fingers. As the other limb was not yet dissected I requested Mr. South, one of our demonstrators, to remove, with care, the upper part of the other thigh-bone; but although he used great caution in doing it, he could not remove the bone without fracturing the upper part of its shaft; but he succeeded in removing the upper part of the bone, so that it could be preserved; and of this bone I have given plates.

We have here then a case in which the neck of the bone was absorbed so that the head was brought in contact with the

trochanter, in which, most decidedly, there had not been a fracture, and in which the disease occurred in each hip-joint.

Another case of the same kind was examined by Mr. South, during the last winter, which, so far as relates to the softened state of the upper part of the thigh-bone, was similar to the former; the head was spongy, the necks were shortened so that there was scarcely any remaining, the trochanter light in weight, spongy, and very large; and there was little if any motion in the hip-joint, and both limbs looked, at first sight, as if dislocated upon the pubes.

But the best specimen of this state of the bone is the following, which I preserve with the most assiduous care, and value in the highest possible degree:—I have had for twenty years in the collection of St. Thomas's Hospital, the thigh-bone of an old person, in which the head of the bone had sunken towards its shaft. I have been in the habit of shewing this bone twice a year as a specimen how bones sometimes become soft from age and disease, and from the absorption of their phosphate of lime; and I had frequently cut, with a penknife, both its head and its condyles to shew this softened state. On sawing through its cervix, the cartilage, deprived of its phosphate of lime, had dried away in several parts, and the appearance was such, that a person ignorant of the change would have declared it to be a fracture: only, that in some sections the cartilage had taken different directions, and in some the bone was not yet entirely absorbed. We have also in the

Museum of St. Thomas's Hospital, a skeleton in which both the thigh-bones, and each os humeri, are, in a subject extremely altered by rickets, divided by similar portions of cartilage, in which no ossific matter exists.

The plates which are appended will afford better ideas of these morbid changes than words can convey; and I hope Mr. Stanley will also give plates of his preparations; only *both* must be engraved, as without both the public cannot form a correct opinion.

To conclude:—The remarks of our author have led me to think better of my work than I had previously been disposed to do; for, although it is quite clear he felt no disposition to conceal my faults, he has not succeeded in detecting a single error. If, by observation, by dissection, or by experiment, he had shewed me to be wrong, I would be the first to acknowledge it; for I hold it to be the strongest evidence of a feeble mind to refuse the confession of error. I was much pleased with Mr. John Hunter, when attending his lectures, for the following remark to a pupil who observed to him, that he had given a different opinion upon a subject in that evening's lecture from that of the preceding year:—"Well, and what then," said Mr. Hunter; "God forbid that I should not be better informed this year than I was the last, for I hope every year to improve."

If from my pen even some substantial errors had fallen, they ought to have been excused by those who know that the work was written by one whose time was variously and almost constantly employed in lectures, in hospital and in private practice; and, instead of endeavouring to blazon them abroad,—as his object, he says, was to benefit the profession,—it would have manifested a better mode of thinking to have pointed them out in private that they might have been corrected in another edition.

When *forty-five* cases of united fracture of the neck of the os femoris are shewn against my *forty-four* of non-union, I will give up my general principle of non-union: and when five cases* of fractures decidedly into the capsule are produced, of union by bone of this fracture (by surgical treatment), without lameness or shortening of the limb, and the person walks better than he now does by the ligamentous union, I shall say that he who effected it deserves well of his country: but until that period arrives I shall continue of my present opinion.

It is a reproach to some few of our English surgeons that the French, who formerly thought these cases admitted of ossific union, are now advertising a large reward for the best account of the cause that they do not unite by bone.

This concludes for the present the ideas which were excited in my mind by reading the work which I have analyzed; and if, in

* One case of union would not suffice, if one could be produced as the effect of surgical treatment; because, we know that a fractured patella will, in a very rare case, unite by bone, and so will a fracture of the olecranon.

the course of these observations,—which I have been compelled in self defence to make,—any unnecessarily strong expressions have escaped me, I request that the author will not impute them to any inimical feeling, but to my zeal in the cause of a profession to which I have devoted the greater part of my life.

FINIS.

EXPLANATION OF PLATES.

PL. X.

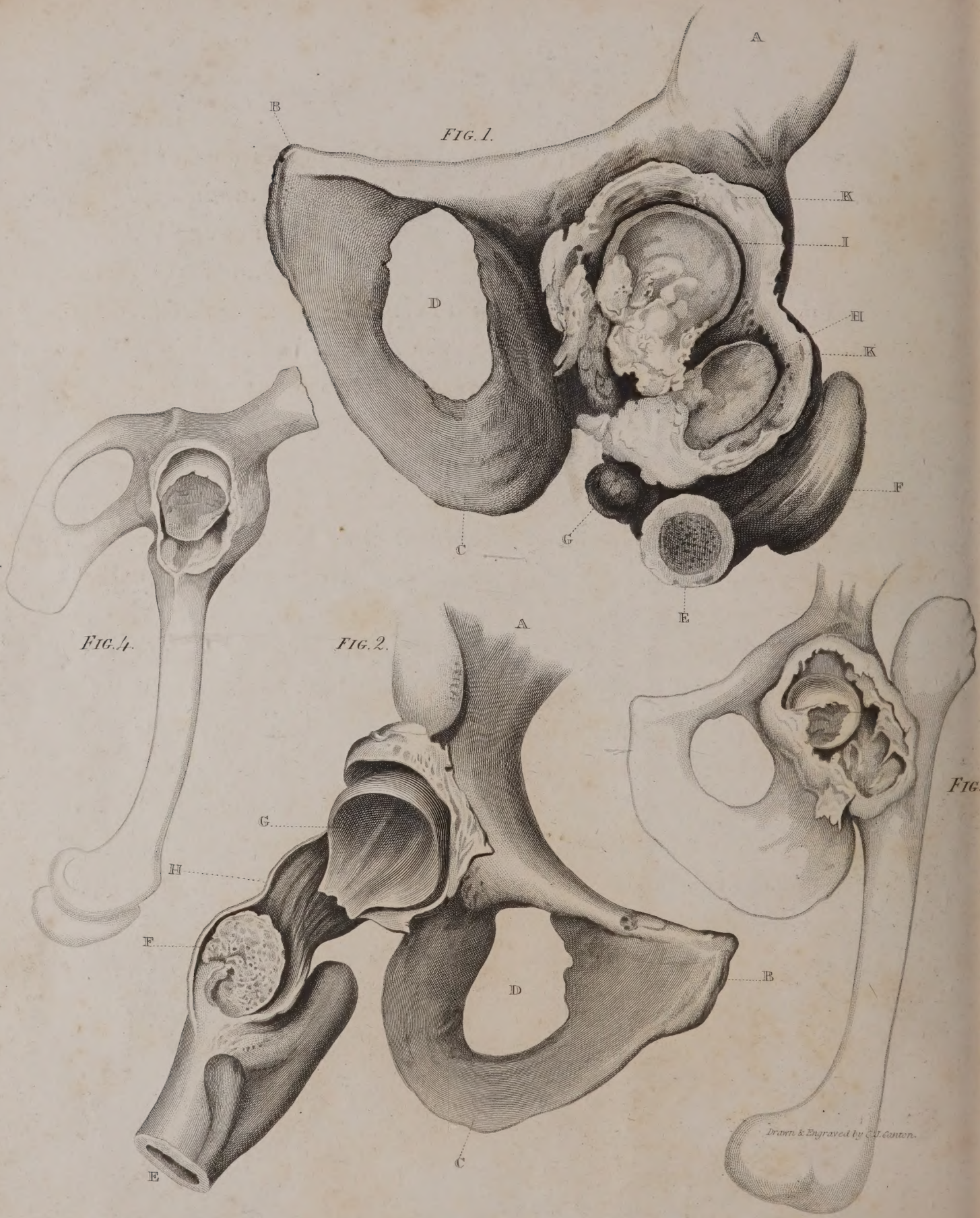


FIG. 1.

FIG. 4.

FIG. 2.

FIG.

Drawn & Engraved by C.J. Canton.

Published by Astley Cooper. 1822.

PLATE X.

Shews Fractures of the Neck of the Thigh-bone in man and in other animals, as they usually appear on dissection.

Fig. 1.

Ligamentous Union shewn.

A. Ilium.
B. Pubes.
C. Ischium.
D. Foramen ovale.
E. Os femoris.
F. Trochanter major.
G. Trochanter minor.
H. Neck of the thigh-bone broken within the capsular ligament, and in a great degree absorbed, as it generally is soon after the accident: its surface smooth from friction, and rounded to roll upon the hollow of the head of the bone.
I. Head of the bone hanging in the acetabulum by the ligamentum teres only, smoothed by one bone rubbing against the other: a portion of its surface having ligament secreted upon it.
K. The capsular ligament exceedingly thickened; more especially on that part of the joint which is opposite to the foramen ovale.

Fig. 2.

A. Ilium.
B. Pubes.
C. Ischium.
D. Foramen ovale.
E. Os femoris.
F. Broken cervix femoris in a great degree absorbed.
G. The head of the bone supported by the ligamentum teres, and having no other connection with the body: its surface smoothed by friction when the person begins to walk.

In each of these preparations the head and neck of the bone conjointly would not form more than one third the natural length of those parts.

Fig. 3.

The neck of the bone broken in a dog, and no union is produced but by ligament.

Fig. 4.

The neck of the thigh-bone broken and ununited but by ligament. The ligament in this experiment was not injured in breaking the bone.

PL. XI.

Fig. 1.

Fig. 2.

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PLATE XI.

Fig 1.

Shews a preparation of Mr. Langstaff's.—A fracture of the thigh-bone united, as it usually is, by ligament.

A. Head of the thigh-bone.
B. Trochanter major.
C. Trochanter minor.
D. Shaft of the os femoris.
E. Capsular ligament excessively thickened.
F. Ligamentous productions uniting the neck to the head of the bone.
G. A fork formed in the trochanter minor, which received the head of the bone, and prevented its further descent.

Fig. 2.

Shews a Preparation of Mr. Langstaff's.—The upper part of the Thigh-bone broken within the Capsule and external to it. That external to the Capsule firmly united by bone, and that within it ununited. I request the reader to attend to the following description :—

A. Head of the thigh bone.
B. Trochanter major.

C. Trochanter minor

D. Shaft of the bone.

E. The ligamentum teres, in its usual situation as regards the head of the bone, and, as will be seen, not at its centre.

F. Fracture of the thigh-bone external to the capsule, firmly and well united by bone.

G. Fractured cervix within the capsule still remaining ununited even by ligament.

Our author says, "The bones were very accurately opposed to "each other." Secondly, he says, "*I perceived that very firm* "*ligamento cartilaginous union had taken place, not merely round* "*the edges of the fracture, but upon the whole broken surfaces.*" Where are these to be seen? I never before saw so little attempt at union in any case, compare for instance, *Fig.* 1 with 2.

"Thirdly, It was evident that a considerable portion of the "reflected membrane was not torn through." The periosteum must be meant.

Again he says, "*This strong ligamentous union, which is evi-* "*dent from the whole fractured surface,* must have called for as "much increased action as a similar deposit of bone would have "required."—There is no union:—and I mean to shew at a future time that the principle even is erroneous.

GARD. HERB. FOR Missing leaf

PL. XII.

Fig 3

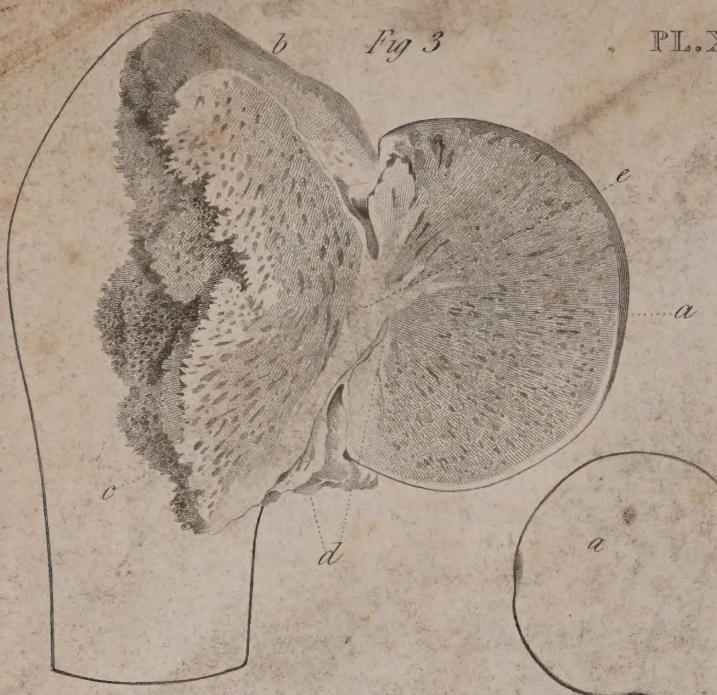

Fig 2

Fig 1

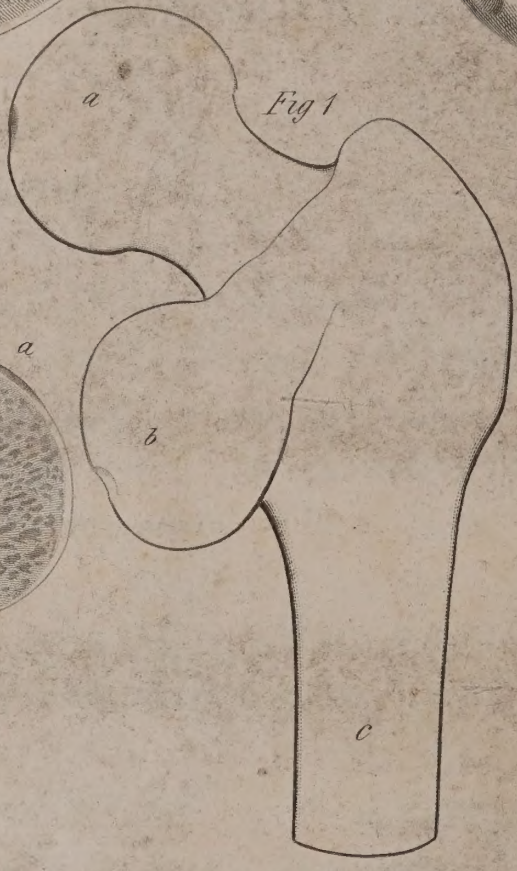

Fig 8

Fig 4

Fig 5

Fig 7

Fig 6

the line of absorption extends quite through; two in which it extends partially through; and one in which the line of absorption has taken quite a different direction.

Fig. 6.

Shews the greatest descent of the Head of the Thigh-bone which I have seen.—Let this section be brought in comparison with *Fig.* 1, and the great alteration which it has undergone will be at once obvious; the Head of the Bone, instead of being at A, is at B of *Fig.* 1, pressed down by the super-incumbent weight of the body.

A. Head of the bone.
B. Trochanter major.
C. Shaft of the bone.

Thus the neck of the thigh-bone undergoes great changes in form, length, and direction.

Fig 7.

Shews the changes which are sometimes found in old and bed-ridden persons.

A. Head of the thigh-bone.
B. Trochanter major.
C. Cancelli of the neck of the bone increased in coarseness by absorption, so as to render the bone weaker, and, when dried, diaphanous.
D. Piece of bone added to the upper part of the cervix.
EE. A larger piece of bone added to the lower part of the cervix, to support the weakened neck of the bone.

If sections are made transversely of the neck of the thigh-bone in old persons, the neck of the bone is found so exceedingly spongy, as to be unable to bear even slight concussion.

Fig 8.

Is a fracture of the Neck of the Thigh-bone in a person between thirty and forty years of age. The preparation was lent me by Mr. Herbert Mayo.

The bone was shortened an inch only, because a fork in the trochanter minor has caught the neck of the bone, and prevented its further descent. The person lived nine months after the accident, and notwithstanding the age being favourable, the bones being nearly in apposition, ligamentous union only was produced.

A. Head of the bone.
B. Trochanter major.
C. Shaft of the bone.
D. Fork in the trochanter minor.
E. Fracture united by ligament only.

It is curious to observe how little the head of the bone is changed in this fracture after nine months. Any other bones in the body but those forming parts of articulations would be loaded with ossific matter.

I had not time to introduce my views of non-union of fractures of other bones in this portion of my appendix, but they will soon appear.